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ABSTRACT

This paper summarizes the findings of a research project that was designed to assess the utilization of computer simulation models in the administration of higher education. The problem was approached through an examination of the experiences reported by colleges and universities that had implemented and were using one or another of these models as an administrative aid. The case studies represent a variety of institutional types and structures and reflect experiences with 3 of the more widely used simulation systems. These are generally known by the acronyms of CAMPUS, HELP/PLANTRAN, and SEARCH. It seems that overall, experiences to date have indicated that the time and expense involved with computerized planning models have not been justified in terms of the extent of their utilization. However, this conclusion must be considered in the context of their utilization. However, this conclusion must be considered in the context of the following qualifications: (1) an important benefit of the utilization of these models is that attention is focused on long-range planning; (2) the models have the greatest potential of becoming a valuable tool in institutions that are in the process of change; and (3) the value of computer planning models in higher education is dependent on the ability of the user to recognize situations in which this tcol is needed and appropriate. (HS)

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COMPUTERIZED INSTITUTIONAL PLANNING MODELS:

An Objective Analysis

A presentation to the

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1973 Annual Meeting
Palmer House, Chicago, Illinois
March 25-29, 1973

by

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COMPUTERIZED INSTITUTIONAL PLANNING MODELS
An Objective Analysis

INTRODUCTION

The financial support of higher education is one of the major political issues of the day. Congress, State Legislatures, Boards of Trustees and administrators find themselves increasingly involved with difficult questions concerning funding of higher education.

While there is little disagreement concerning the fact that higher education is facing a financial crisis, there is considerable disagreement over the approaches to meeting this crisis. Traditionally, university administrators have turned mainly to the receipt of additional funds as the solution to their financial problems. And traditionally, they have received those additional funds.

Recently, however, relative publics are beginning to demand more efficient allocation of currently available resources to meet this crisis. People are talking about "accountability." Questions like "Can we get the same product for less money?" are being asked.

In answering these demands, unpopular decisions will have to be made and explained. Mythology, folk-lore, and even common sense, are no longer acceptable bases for making decisions. College and University administrators need a technique that can provide the comprehensive data, at the time it is needed, which will help them to choose between alternatives when faced with difficult decisions.

As a result of this need, several organizations have developed computerized planning models that are especially designed for use by administrators of higher education. These planning models are generally associated with one or another of a plethora of acronyms. We think of WICHE, NCHEMS, RRPM 1.4, RRPM 1.6, HELP, PLANTRAN I, PLANTRAN II, SEARCH, CAP:SC, PPBS, MIS, CAMPUS, V, VI, VII and VIII, and a host of others, all of which are concerned in one way or another with improving the flow of information to administrators. The systems referred to by these acronyms represent the most advanced state of the art of computerized planning systems.

Generally, these systems can be understood as mathematical models which have the capability of "simulating" the university. With this technique the administrator has an opportunity to test the consequences and implications of complex policy decisions before making them in real life. Furthermore, each of these systems has the capability of projecting resource requirements (in a variety of modes) into the future.

The majority of the systems have a common basic approach. They build a "model" of the university in terms of characteristics that the administrator wishes to have included (i.e., enrollment figures, fiscal figures, space, personnel, etc.). Next, a series of assumptions concerning the model are identified (i.e., enrollment will rise, fall, etc.). Third, the model is "moved" into the future, thereby "simulating" expected university activities in terms of initial modeling characteristics and assumptions.

Although the power and sophistication of similar computerized planning models have been proven in business and government applications, certain questions remain to be answered about the effectiveness of these models as an aid to

administrators of higher education. The ultimate goal of simulated planning models is to enable colleges and universities to make more rational decisions about the use of their own resources and the direction of their development. However, Rourke and Brooks[1] have found that the extent to which this expectation has been fulfilled in higher education is as yet far from clear. While the literature reveals many articles which refer to the use of computer simulation as something of a panacea, other writers continue to express doubts concerning the suitability of its application at a level of complexity comparable to that of administering a university.

As the number of colleges and universities using computerized planning models continues to rise, it becomes increasingly important to examine objectively the reactions to this new science. This paper summarizes the findings of a research project that was designed to assess the utilization of computer simulation models in the administration of higher education.[2]

METHOD OF PROCEDURE

The problem of assessing the use of computerized planning models was approached through an examination of the experiences reported by colleges and universities that had implemented and were using one or another of these models as an administrative aid.

A semi-structured interview instrument was administered to appropriate personnel at eight selected institutions from across the nation. The findings were then reported in case study format with the aim in each case being to identify the extent of utilization of simulation, determine the problems

involved, and present the findings in the context of the local situation.

The case studies represent a variety of institutional types and structures and reflect experiences with three of the more widely used simulation systems. These are generally known by the acronyms of CAMPUS, HELP/PLANTRAN, and SEARCH.[3] Although the efforts of the Western Interstate Commission on Higher Education may appear conspicuously absent from this list, at the time the study was initiated no institution had utilized the RRPM for a sufficient period of time to permit a meaningful assessment.[4]

SUMMARY AND ANALYSES OF FINDINGS

While experiences during the implementation and utilization of computer planning systems varied from college to college, certain common factors were identified which appeared to contribute to the extent of successful utilization. Based on these findings a number of conclusions and recommendations were drawn, the more significant of which are summarized below.

Factors Influencing the Purchase and Implementation of the Computerized Planning Model

(1) Two primary factors were identified which influenced the decision to purchase and implement a computerized planning model: (a) the effort of an individual on the university staff who had a personal interest in new techniques of management, and (b) a recognized need by university personnel for a tool to assist in answering "what if" types of questions.

(2) Once purchased, the system was used more extensively in those institutions which purchased it to meet a recognized need, than in those

institutions which purchased it primarily because of the recommendation of an educational innovator.

It might be inferred from this that the relevance of these systems to administering higher education will not be generally recognized until the planning process on the campus has progressed to a point where administrators are forced to decide between alternatives and are aware of the need for information concerning the implications of choosing one alternative rather than another. At that time a computer-based planning model will be recognized as a useful tool in assisting with decision-making.

(3) No discernible pattern was evident concerning the decision to purchase one of the models in preference to another, although it was clear that much of the discussion centered on choosing a model of appropriate complexity.

The confusion over the desired complexity or simplicity for a given model reinforced a general limitation that can be identified in the literature. That is, that in order to represent the system accurately, there is a tendency to develop more complicated models. As models become more complicated they become less easy to understand and thereby defeat the purpose of constructing a model (i.e., simplification of the real system to facilitate understanding).

Experiences Reported by Institutions During Implementation

(1) The time to make the system operational was significantly underestimated in each implementation. Several problems were identified as

contributing to this condition. The first and most significant was that considerable modification was required in several of the models prior to utilization. This factor may have far-reaching implications for the use of these systems in higher education. It might be inferred that "system packages" specifically designed for one institution are not readily adaptable to other institutions. This inference would support arguments advanced by some administrators concerning the "uniqueness" of higher education and the resultant inapplicability of scientific management techniques.

However, when the findings leading to this conclusion are examined carefully, it appears that another inference might be more valid. That is that the immediate modification in models arises from the fact that the sophistication of the user has not developed to a point where he can identify appropriate and inappropriate uses of the model. A review of the literature will indicate that the value of any computerized planning model is largely dependent upon the ability of the user to determine situations in which it is appropriate. Extensive modification in the system might imply that the model was being applied to a problem for which it was not appropriate.

(2) A second factor that was identified as contributing to the length of time involved in implementation is the inexperience of the personnel responsible for using the system. The assumption that a person with no prior experience with computers can operate a simulation system would appear to be invalid. The findings of the study indicate that inexperienced persons may implement the models eventually, but that if the system is to be used efficiently the user must have had some prior experience in the use of simulation models or computers, or both.

(3) A misunderstanding of what the term "implementation" implies may have been a third factor which contributed to the discrepancy between actual and estimated implementation time. Quite possibly, implementation has a different meaning for the firms installing the system than it does for the institutions that are utilizing them.

(4) Institutions that relied primarily on university personnel during implementation experienced more difficulty than institutions that utilized the services of the firms that developed the models. The least difficulties during implementation were reported by those institutions that contracted the entire implementation to outside personnel. Generally, the problems encountered during implementation were in the areas of data collection and computer technology.

(5) A lack of wide and active participation by university personnel during initial stages of implementation appeared to influence the extent of future utilization of the model.

From this finding it may be inferred that participation leads to a fuller understanding and eventual acceptance of the model. This would support the argument that resistance to the utilization of "scientific management techniques" stems mostly from men who misunderstand the nature of modern administration. Further, in those instances when participation in the development of the model was limited, and use was also limited, one might infer that the model was comparatively unsuccessful as a result of misunderstanding on the part of those who were not involved.

(6) In-service sessions and in-service materials influence the extent of utilization of the systems. In addition to increasing the number of sessions and personnel involved, there was seen to be a greater need for improving the content of some of the in-service sessions. Consideration and discussion of the "human element" as it related to the use of the model was seen to be as important to successful utilization as technical considerations.

Means and Methods of Utilization

(1) The systems were most extensively utilized when a formal planning process was in operation at the university prior to its implementation. Experience suggests that implementation of a system prior to proper preparation tended to complicate rather than clarify its role in the overall planning process. In this regard, the computer model was not a substitute for planning but rather a tool to be used to supplement the planning process.

It seems clear that the computerized planning models will have relevance and applicability to higher education only when a less sophisticated system of planning has already been used successfully, and when acknowledged need for further and more detailed analysis leads to an understanding of the specific circumstances in which this technique is appropriate.

(2) The amount of confidence placed in the accuracy of reports generated by the model (by those persons in a position to make decisions based upon these reports) was found to be a function of broad participation

by the institution's personnel in the development of the model and confidence in the individual conducting the simulation. Greater confidence among the users of planning reports was noted when there was wide and active participation in the development of the assumptions and formulas used in the model. Additionally, confidence held by university personnel in the ability of the administrator responsible for the model was found to be correlated to confidence in the system itself.

(3) The accuracy of the base data in the initial use of the model tended to influence the extent of future utilization as well as the degree of user confidence in future uses. University personnel often view the initial use of the system with cautious skepticism. The careful collection of accurate base data will enhance the potential for successful utilization and consequently help overcome the skepticism.

(4) It is not possible to draw any conclusions concerning the most appropriate institutional office to be responsible for primary utilization of the model.

However, one observation may be relevant. Generally speaking, it appeared that the personal and political influence of the individual having responsibility for the system was a more significant factor in successful utilization of the model than the position which he occupied.

CONCLUSIONS

Generally speaking, it is suggested that institutions planning to proceed with implementation of a computerized planning model evaluate the prospective systems in terms of four basic criteria.

(1) PERFORMANCE - How effective is the system in getting the answers I want?

(2) UTILITY - How useful is the system? How often will it be used? Is it flexible enough to accept major changes in organizational structure? How many people can make use of it?

(3) TIME - What is the time required for installation? How much time is required for collecting base data necessary to operate the system? What is the time required to retrieve information?

(4) COST - Is the value of the information worth the cost of implementation? Will it save money in terms of time and personnel? Do we really need one at current costs?

If the criteria are applied to each of the available systems, much frustration will be eliminated.

In conclusion, I must say that overall, experiences to date have indicated that the time and expense involved with computerized planning models have not been justified in terms of the extent of their utilization. However, this conclusion must be considered in the context of the following qualifications: (1) an important benefit of the utilization of these models is that attention is focused on long-range planning, (2) the models have the greatest potential of becoming a valuable and appropriate tool in institutions which are in a process of change, and (3) the value of computer planning models in higher education is dependent upon the ability of the user to recognize situations in which this tool is needed and appropriate.

When there was an existing and recognized need for a tool to assist in determining the impact of alternative courses of action, the model was seen as a relevant and applicable tool. On the other hand, when models were applied to a problem prior to a need for the tool being evident, major difficulties were encountered.

In the opinion of administrators who used the systems, efficiency of utilization will increase as the user becomes more familiar with the advantages and limitations of the system. Additionally, there was an expressed "feeling" that, just as during implementation of any new administrative technique, a certain time factor is necessary to work out problems, gain the confidence of the staff, and overcome resistance to change.

As these conditions are met and proper preparations made, computer planning models will have the potential of becoming a valuable administrative aid. With the passing of time and the satisfaction of certain other stipulations which have been identified above, the potential should be achieved. At that time, the use of computerized institutional planning models in the administration of higher education will provide valuable assistance in the task of more efficiently allocating institutional resources.

RECOMMENDATIONS

In an attempt to capsulate my opinions concerning problems and prospects of computerized institutional planning models, I have formulated a series of recommendations. Empirically speaking, I would say that consideration of these recommendations by institutions planning to proceed with implementation of a computer based planning system will help eliminate some of the problems and brighten some of the prospects.

(1) A specific need and a high-level commitment to planning should be generally evident in the institution prior to implementation of a computer based system. What happens on campus prior to implementation is just as important in terms of successful utilization as what happens following implementation.

(2) An institution should carefully select a model or system that is best suited to the unique needs of the individual college or university. Care must be taken to insure that the model is not too simple to represent the institution adequately or too complicated to be easily understood.

(3) An institution should take care lest it underestimate the time necessary to make the system operational following the decision to purchase. Experiences reported indicate that the time necessary to operationalize the system is generally significantly longer than the initial estimate.

(4) An institution or installing agent should define and clarify what is meant by the terms "installing," "implementing," and "operationalizing" the model. Experience has shown that these terms often have a different meaning for the firms installing the model than for the institution that is using the model.

(5) An institution should encourage wide and active participation and involvement with the model from the outset. Lack of participation by the institution's personnel in the development of assumptions and formulas to be used in the model is a strong predictor of unsuccessful utilization.

(6) An institution should employ a person to physically operate the system who has prior experience with models, computers, or both. The findings of the study indicate that, contrary to prevalent assumptions, a person with no prior experience in these areas cannot efficiently operate the system.

(7) An institution should employ the services of one of the professional firms to implement the system. Experience has shown that this may be less costly than attempting the task solely with college or university personnel.

(8) An institution or installing agent should thoroughly discuss the rationale for any initial major technical or conceptual modifications in the model. It may be possible that the model is not appropriate for the institution, or more likely, that the problem being approached is not appropriate for the model.

(9) An institution should be prepared to evaluate in-service sessions and in-service materials to be sure that the content as well as the number of sessions is adequate to meet the needs of the institution. In-service sessions should deal with "human elements" which may cause problems during utilization, as well as technical details necessary to operate the system.

(10) An institution should provide adequate time for the administrator who is responsible for utilizing the model to perform this function. Experience indicates that purchasing a system and giving it to an administrator as a "spare-time" activity is a poor investment.

(11) An institution may establish confidence in the results of the system by placing the model in the office of an administrator whose judgment is respected and who has an appropriate level of personal and political influence and prestige within the institution. Although this may cause problems if the individual leaves the institution, experiences indicate that the confidence that university personnel have in future simulations is positively correlated to the confidence obtained as a result of the initial utilization.

(12) An institution should take extreme care in the collection of base data to be used in the model. Do not attempt to conduct any studies with the system until the staff has complete confidence in the validity and accuracy of the base data. If the institution is not experiencing major change of one form or another, it should carefully weigh the value of a computerized planning system against the time and expense involved in its purchase and implementation.

(13) An institution should only use the system in areas for which it is more appropriate than other techniques. The ability to determine when this tool is, and is not appropriate, is the primary determinant of its value to the institution.

FOOTNOTES

1 Francis E. Rourke and Glenn E. Brooks. The Managerial Revolution in Higher Education. Baltimore, Md: The Johns Hopkins Press, 1966.

2 Jerome F. Wartgow. "An Assessment of the Utilization of Computer Simulation Models in the Administration of Higher Education." Doctoral Dissertation, University of Denver, 1972. (Available from University Microfilms, P. O. Box 1346, Ann Arbor, Michigan 48106)

3 Up-to-date information concerning workshops, technical capabilities and cost of implementation is available from the following organizations:

CAMPUS
Systems Research Group
252 Bloor Street West
Toronto 5, Canada

HELP/PLANTRAN
Midwest Research Institute
425 Volker Boulevard
Kansas City, Missouri

SEARCH
Peat, Marwick, Mitchell & Co.
345 Park Avenue
New York, N. Y.

4 For information concerning latest developments with RRPM contact:

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Dr. Willis E. Snowbarger, Dean of the College
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DO NOT RELEASE BEFORE
MONDAY, MARCH 26, 1973
AT 9 A.M.

IN-SERVICE TEACHING IMPROVEMENT

I was flattered to be asked to make a presentation on in-service teaching improvement until Dick Gottier told me the reason I was asked. He couldn't find other such programs about which to report. I should confess that I am talking about a new program on our campus initiated this year, although the idea of a professional meeting of the faculty once a month does have roots on our campus that go back many years. With a large number of faculty members under 35 years of age (and 30 to 35 years of tenure ahead) such a program seemed not to be a luxury but a necessity.

I

I understand that it is my responsibility to suggest how such a program can be placed into effect. First, there was on our campus a felt need for an in-service teaching improvement seminar. This need was felt by faculty as well as administrators. Recently, a joint committee of students and faculty had been studying student evaluation of teaching and prepared an instrument which the committee felt would be appropriate for this purpose. In addition, the Committee on Excellence which was a part of our self-study "A Vital College: 1980", discussed the needs for faculty development. They included under "Professional Improvement" the following recommendation: "That a standing faculty committee with released time to work with the Dean be appointed to implement a faculty forum for the improvement, development, and inspiration of the faculty as a part of a continuing education program." This recommendation came without any prompting from the Dean's office. At the same time, I had felt a need for a means of encouraging the development of innovative programs on the campus. Like most of you I faced the problem that I could not assign very much budget to the matter. There was one other development that bears upon the timing of this question and the ease with which we were able to initiate a rather full blown program. That was a decision in the faculty meeting (and on the recommendation of the Dean) that we schedule two meetings of the faculty per month, one designated as a business meeting and the other one for professional purposes. We decided to meet at 3:30 p.m. on Wednesday afternoons. We specifically recommended that all classes be scheduled around this time so that every faculty member was free to attend. We did not guarantee to be finished by 5:00 p.m. although we felt that no meeting should go beyond the hour of 5:30. We designated the second Wednesday as the normal time for the professional meeting and the fourth Wednesday as the time for our business meeting. With this recommendation before them, the faculty voted to hold such meetings and this helped considerably to lay the background for what I think has been a fairly successful series. While this is not an ideal hour from some standpoints, our faculty had been accustomed to an evening meeting once-a-month and there was something in it for them and their families if we could save one more free evening.

II

The next question was how to implement this program within a limited (or even no) budget. Seeing the background we had for it, I seized the

initiative and proposed to the Academic Affairs Committee a schedule of topics to be treated in a teaching improvement seminar which included the topics that the Committee on Excellence of the previous year had proposed. By taking the initiative, I did not propose a committee with released time. And I did not propose a separate standing committee. Our Committee on Academic Affairs having very broad concerns in this area seem to concur that if I would develop the ideas they would provide the sounding board, and they gave their approval and support for my proposal.

Obviously, the initiative was back on my desk. I was authorized, but now I had to plan ahead. We worked out a plan of topics for the year which I shall read, not because they should be repeated elsewhere, but it would give you an idea of the kinds of things we are doing.

October - "The Ideal Olivetian" - NCA Liberal Arts Study Workshop Report

November - "How to Plan for and Write Behavioral Objectives for Courses" - a Panel of Faculty

December - "Tutorial Methods and Mini Courses" - Teacher of General Zoology and his Department Chairman

January - "History and Mission of Nazarene Colleges - Dr. Timothy Smith

Other topics for the year as now projected include:

"Strategies for Causing Learning"

"A Theoretical Model of College Teaching Style"

"Self-assessment of the Teaching Act"

And the Committee is full of ideas for additional topics. What might surprise you is the quality of presentations. Most, if not all, would come up to the quality of these meetings here in the Palmer House.

You see the NCA Workshopper spent two weeks in Denver working on the question of how our objectives get translated into a graduate. A teacher working on an innovative teaching method reports on the project and his chairman shows that the new method is financed within the budget for a traditional approach. A guest lecturer from Johns Hopkins compares and contrasts teaching on our campus and his experience in the university. A prospective teacher shares some findings of her doctoral dissertation on college teaching. And, the NCA resource person shares with our faculty the wisdom of a visiting fireman. This leaves only two or three meetings per year to assign to a brilliant faculty member or a panel to dig out some tailored topic which can be accomplished during the year if enough notice is given.

III

What then are the bare essentials for such a program? First, we should find or build a general concensus that the faculty wants to participate in professional in-service development. Once the program is started we would have to continue to reinforce the concensus to keep it going, but I am convinced this can be done. The second essential is a regular meeting time. Times can be juggled if speakers are to be here next week instead of this week. But a regular time will encourage all of us to plan for, and meet, a deadline. Thirdly, some person (and probably an advisory committee) must be designated to propose and plan a series of topics and speakers for the year. Four, some general publicity and reminders must be kept before the faculty. Otherwise they become busy and would forget to attend the meetings. Fifth, there should be some scheme of evaluation and for drawing the ideas and support from the natural leaders of the faculty. I am thinking in this regard of the division chairman, department heads, perhaps some administrators, and perhaps a very enthusiastic teacher. This group must be with you in this effort if it is to succeed.

IV

Among the surprises in operating a program of this sort, are the following:

1. How modest some faculty are to say anything before the whole faculty. Even those who have a very fine program to present may be very reluctant to do it.

2. How good our attendance is. I think our attendance is as good at the professional meetings as at the business meetings.

3. The number of quality subjects that have been suggested from time to time.

4. The number and quality of resource people who are on your campus, on your faculty, in the course of a year.

5. The sensitivity that you can encounter over recognition given. It arises both from the appreciation shown by those who are asked to demonstrate something they have done that is good and innovative. And tension sometimes arises with other excellent teachers whose programs are not so unusual and seemingly are not being given equal recognition.

I think these surprises might have been expected perhaps, and especially this latter question of the sensitivity of faculty members. Even this is probably to the good because, after all, it is not that easy to get the attention of the entire faculty for any program that the Dean tries to encourage. If there is a bit of tension and if such matters are talked over coffe cups and in the divisional conference rooms, so be it.

by W. E. Snowbarger